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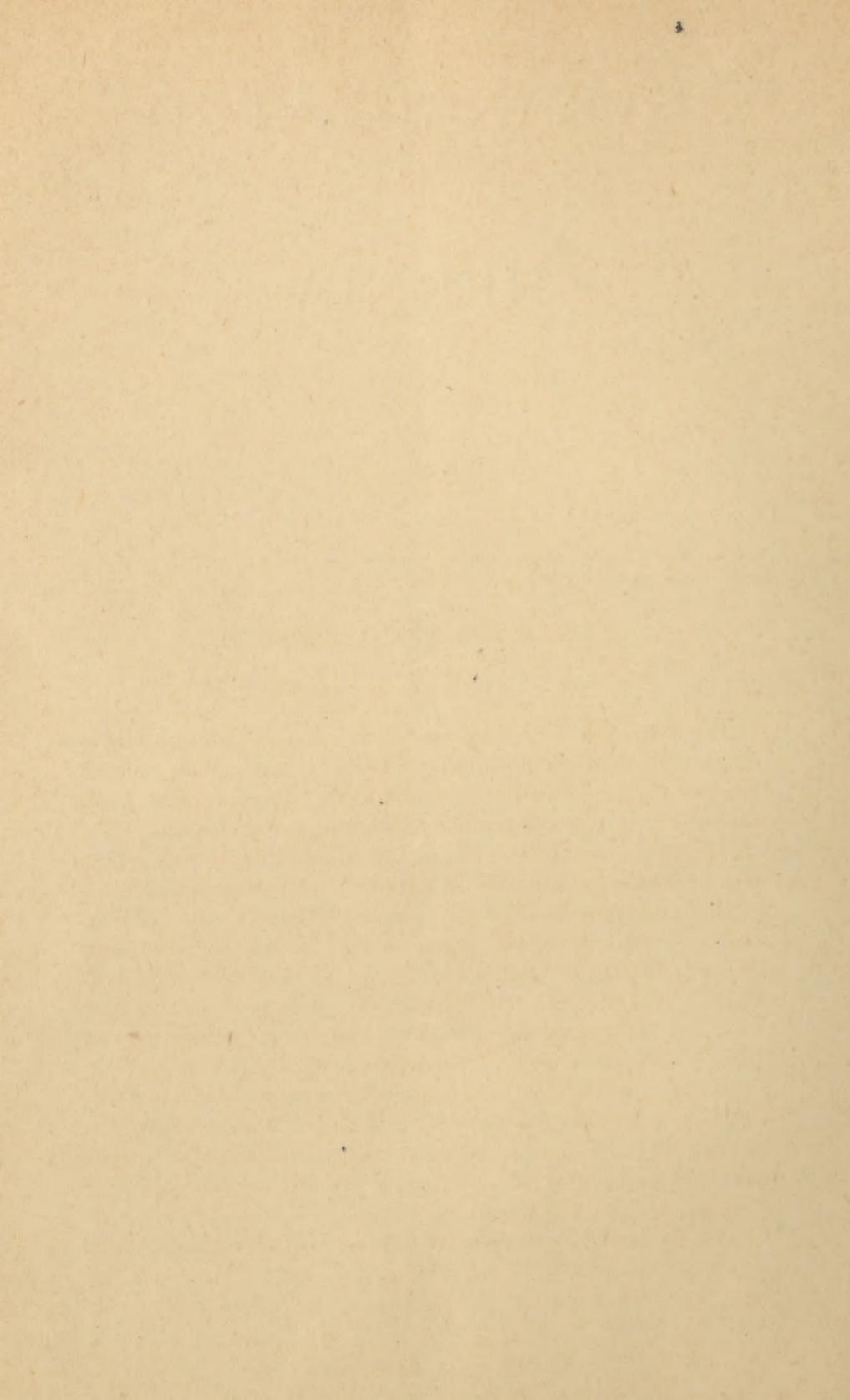
STRANGULATED

HERNIA.



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STRANGULATED HERNIA.

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The difficulties and dangers connected with strangulation of rupture arise, in general, from a radical misconception of both the nature and causes of the accident. Misconception leads easily to fatal mismanagement. Speedy, safe, certain and entirely painless removal of strangulation, and consequent reduction of the protruded mass, is feasible. This result depends on a clear comprehension of the intrinsic nature of the affection and the mechano-physiological principle on which its existence depends. It is the present purpose to set forth these principles in an intelligible, and at the same time, practical way; to give such details and explanations as will enable *any* physician, even though unfamiliar with surgical processes, to secure success, even in cases that must otherwise be doomed to fatality.

The practical application of the principles to be explained is of equal value in cases of inguinal, femoral, or scrotal strangulation; whatever may be the size of the sac or the degree of peril the sufferer may be in.

The contents of the hernial sac, are usually regarded as a

structural mass of practically solid material. It is this misconception that dominates the procedures for its reduction, or return to the abdominal cavity. The problem, as usually presented, is that of crowding the mass through the narrow, irregular and sinuous channel through which it escaped, by direct manipulation, or taxis; or, failing in this, to enlarge the opening by the knife and by stretching, till the protrusion returns. This method is hazardous, of uncertain success, and unnecessary.

The contents of the sac, however solid in appearance, to the touch, and other exterior tests, are, in fact, mainly fluid, and should be treated as fluid. A bladder, fully distended with air, is also hard and resisting, and could not be forced through a small opening. But it is easily pricked, and immediately accommodates itself to any requirement.

So, also, may the contents of the strangulated hernial sac be passed without difficulty *as fluid*, through any opening, however restricted, irregular, inflamed and clogged; whatever morbid qualities these contents may have acquired. It is only necessary to employ remedies corresponding with the nature of the case, that is, adapted to transfer fluids.

The scientific propriety of regarding the contents of the hernial sac as mainly fluid, appears, when we consider these contents separately. The more formidable the size and the greater the appearance of solidity, the greater, in general, the actual preponderance of fluid. The fluid ingredients enter the sac by the arterial vessels. They are retained and accumulate through restriction of the outlet or venous vessels at the hernial neck. The growth of the tumor and its firmness are largely due to accumulation through arterial pressure. The local capillary network becomes enormously dilated and the thinned capillary walls allow the more fluid parts of their contents to escape into the exterior space, till further increase is checked by the limited elasticity of the exterior coverings. The cells, fibres, membranes, etc., forming the structural elements of the contents of the sac do not, under these circumstances, increase in structural, but only in fluid ingredients. Neither the fluids imbibed by the inert structural substance, nor the free fluids, can be discharged from the sac, till proper exit is provided.

It thus appears that the relative amount of the structural ingredients of the hernial sac, is insignificant, and that the adven-

titious fluids with which these ingredients are associated, gives them a factitious importance which entirely disappears when the mass is treated as though it were fluid. The deceptive appearance of the hernial mass is maintained so long as it is treated as so much solid, and in bulk.

The first step, therefore, in dealing with strangulation is to provide an adequate method for disposing of the fluid contents of the hernial sac. The least degree of the realization of this purpose affords exit to the pent up contents of the sac, and hence, relieves strangulation.

The superior facility of disposing of a given amount of substance in a fluid state arises, of course, from the extreme divisibility of fluids. Instead of being called upon to dispose of a mass, it is only the drops, or even fractional parts thereof, upon which control needs to be exercised. A succession of these depletes the mass. It is not the hernial mass, but its fractional parts which require reduction. And it is no longer strangulation, but the suspended powers which ordinarily move forward the local venous blood, which demand attention.

Now, nature provides means of exit for all incarcerated fluid, including the hernial, by the venous vessels. The passage of venous blood *from* the hernial sac requires the operation of only physiological causes, the anatomical or structural conditions being present. But physiological forces require to be supplied in adequate degree. Luckily for this emergency, these forces are at hand, and only require intelligent direction.

It is likewise needful to consider just what the hernial sac is, to avoid treating it also as what it is not. The hernial and abdominal sacs are really one; the hernial is but a bulging out of the abdominal. The walls of the two are continuous, as are also the contents. The pressure within the two sections of the common space is the same. Should morbid conditions within the hernial section cause local increase of pressure, such increase is advantageous in assisting the return of the pent up hernial fluids. The best conceivable remedy consists in super-inducing such differences of interior pressure as shall drive the contents from one to the other section.

It is further to be presumed, that the cavity, contents and walls or covering of the abdomen, the ruptured and unruptured portions alike, are amenable to the same physical laws as other objects: that mechanics, hydrostatics and gravitation are addi-

tional to physiological existence; that in the emergency of protrusion with strangulation these laws are operative and obedient to conditions, as in health; also that the powers of the organism, vital and physical, may be combined, separated, guided and directed by the intelligence of the physician. It is by such ordering of laws that the conditions producing rupture and strangulation can be controlled and even reversed; in which case, these manifestations cease.

It now remains to show that the laws referred to, well understood, are more than sufficient to meet successfully all emergencies of strangulation of rupture, however difficult or grave; and that the usual remedial procedures for these cases are, at the very best, supererogatory.

The practical application of the principles above foreshadowed, for the actual removal of strangulation and the reduction of the hernia, should proceed by stages as follows:

1. Place the patient on a hard bed, lying on his back, his feet drawn up to his buttocks. Raise his hips till thighs and trunk are in one diagonal line from knees to shoulders and head. Prop his hips with hard pillows, so that the same position may be substantially maintained during the struggles arising from retching, pain and nervous uneasiness, during the few moments preceding relief.

In the position described, the contents of the abdomen gravitate *from* the hernial region. This consequence is seen and felt, in the change of form of the exterior wall of the belly, which crudely indicates the location of the interior mass.

If the contents of the common cavity were liquid, it is plain that in obedience to gravitation they must flow *from* the hernial portion of the cavity, and consequently accumulate at the diaphragmatic portion; this change becoming necessary to maintain their level. The passage of fluid from the one to the other portion of the common cavity necessarily operates to drain the hernial sac. The venous blood-vessels are direct channels of communication between the two portions of the cavity; the pressure is the same in both, and drainage through the vessels, even though it be but a slight percolation, is an inevitable consequence, at least so far as gravitation is capable of producing this effect. That considerable obstacles may be overcome by this unaided power is shown by the fact that steam boilers are in this way supplied with water, against steam pressure.

2. The *structural* solids of the common cavity must have separate consideration. The rupture is an artificial, irregular canal or cleft, in which some portion of omentum, or knuckle of intestine is imprisoned, and thus restrained from obedience to the force above shown. The imprisoned part is a neck, having a body, or bulkier portion, exterior to the canal. The obstacles to the return of the structural part of the sac consist, therefore, of this bulkier exterior body; the irregularities of the closely-fitting neck and canal; and the fixedness or adhesion consequent upon these. But the structural as well as the fluid contents of the abdomen also gravitate. The least degree of this force is therefore represented in the hernial neck as tension, since the neck is an extension from the intestinal mass. The degree of tension or strain at the fixed point or neck is the measure of the gravitation. The contents of the abdomen are, therefore, practically suspended from the hernial neck by a segment of the incarcerated gut. The forces engaged in causing protrusion are exactly reversed. The protrusion is withdrawn whenever the tensile force within the abdomen becomes equal to the sum of the resistances above stated. But these obstacles clearly do not apply in any degree to the *fluid* contents of the sac. This indicates the necessity of separate consideration.

Interior traction, or pulling of the proximal segment of intestine is therefore available, to detach or release the imprisoned portion, and to cause its retraction. This application of force to draw in the structural ingredients of a protrusion may not generally be necessary, but whenever there be need, can be increased with perfect safety to any extent desirable. A certain degree of tension, as we shall see, is extremely useful in facilitating the escape of the imprisoned fluids.

3. Clasp the hands of the patient over the crown of his head and make him bear strongly upon it. *Keep his hands in this position.* In this way the exterior walls of the chest become fixed and immovable. The respiratory muscles of the exterior walls are stretched and tense, and therefore prohibited from both contracting and expanding. They cannot participate in respiratory movements, directly or indirectly, whether under incitation or in quiet. Respiration is not, however, in the least diminished or less effective; only the action of its mechanism is changed. It has become wholly diaphragmatic. The usual thirty cubic inches of air is still displaced at each respiratory

movement, and the diaphragm moves to an equal extent. The diaphragm is the inferior, but not an exterior wall of the chest. The whole mass of the contents of the abdomen lie practically between the diaphragm and the anterior wall of the abdomen. It follows, from the position of these contents, that *the whole mass must recede from the hernial region at each respiratory movement*; and that, were a vacuum possible, the intestines would become separated from the hernial end of the cavity.

Respiratory rhythm resembles in its reciprocating form the movements of a piston. As relates to fluids reached by its influence, the mechanical effects are similar. An inflow of fluids in each case follows the receding motion. The tendency to vacuum, or more correctly stated, the atmospheric pressure at one part, caused by its partial removal at another, becomes effective, in case of respiratory action, in producing an inflow of minute rills of fluid in the direction of the seat of the pump-like action, that is, toward the cavity of the abdomen. An outflow of fluids from the hernial sac through the connecting neck, is necessitated by the mechanical conditions.

But the hernial contents are already under the influence of gravitation. Respiratory action, including the whole of the mechano-vital force engaged in the act, now becomes an additional force auxiliary to, and far more potent than, that of gravitation, urging the withdrawal of the fluids of the hernial sac into the cavity of the abdomen.

That the mechanical effect thus developed is concentrated at the hernial neck becomes evident from these considerations. The seat of the hernia is the most yielding of any part, as is proved by its existence. It is here and here only, that there is a continuous vascular connection between the two cavities, if we consider them as separate. It is here only that there is no peritoneal interruption to the mechanical effect described. That only the point of least resistance yields, while the remainder is unaffected, is shown as truly in the removal as in the production of a rupture.

There can be little, if any, impediment to obedience by the fluids of the hernial sac, to the differentiation of pressure caused by the conditions described. If it be assumed that the venous connections are impervious at the neck, the same cannot be assumed of the inter-spaces of tissue of which the neck is composed. These are filled with fluid, an outflow of which is

caused by the least variation of pressure. The compressed venous capillaries are thereby released, and an outflow of their contents necessarily follows, and strangulation is relieved.

The mechanical influence of the respiratory and other forces when concentrated at the hernial neck will, perhaps, be better understood when expressed in terms well known in surgical practice. Incarcerated fluids, such as pus, urine, pleuritic and other affusions into cavities, are often removed by a process called *aspiration*, for which the word, sucking, may be regarded as an equivalent. In the position and under the circumstances described, the respiratory movements perform the same office in respect to the fluids of the hernial sac. The respiratory movements are, in fact, an aspiratory force, which may with propriety be designated, *auto-aspiration*. It is a power which compels obedience of all fluids whose channels lead toward the abdomen. It is a conceded necessary factor for the physiological return of the venous circulation from the extremities against gravitation—a greater power than is required for the aspiration of the strangulated hernial sac.

4. Gravitation and auto-aspiration are merged as one force in producing tension of the proximal segment of the incarcerated intestine. This tension of the interior portion of intestine is interrupted in form, corresponding with the motions of respiration; a form particularly adapted to detach adhesions, and to loosen the portion of intestine confined by the narrow canal in which it is engaged.

Tension of the segment of intestine within the abdomen produces another effect, favorable to the purpose sought. The intestine is elastic; and when pulled inwards, its tissues are elongated at the expense of thickness. The hernial neck is made narrower than the canal and, therefore, loose within it. Tension of the neck straightens both it and the canal enclosing it, and thus further facilitates reduction by abolishing mechanical obstacles at the point of restriction.

It is of interest to remark at this point that the effect of traction of the intestine from within, is exactly the reverse of that of pushing it from without, under the name of *taxis*. While the first mentioned process diminishes the size of the neck and straightens it, detaches adhesions and removes irregularities. The pushing method reverses these mechanical conditions: it folds and presses together, and renders fixed, the relations of

neck and canal. It also bars the escape of the fluids imprisoned in the hernial sac. It is liable to injure the tissues which have become thinned, softened and unresisting, and produces needless pain.

The practical application of the principles above explained, will in general, prove sufficient to remove strangulation and to allow the strictured contents of the sac to glide, painlessly and almost unconsciously back, beyond the interior extremity of the canal; and no application to the exterior will be required to maintain this effect.

6. Additional means may, however, be employed to increase the efficacy of the principles shown, and render them equal to the requirements of the most desperate cases.

One of these is reflex nervous incitation, so applied as to increase and extend respiratory rhythm, and therefore the effect of auto-aspiration from the sac. The immediate purpose is to deepen the rhythm, to increase the number of cubic inches of air respired, and therefore, the tendency to vacuum in the hernial portion of the cavity. The aspiratory effect is proportionally increased. The readiest way of securing the object is this: While the patient remains in the position described, the physician puts his hand upon the patient's abdomen, near the symphysis pubis. This act engages the nervous powers of the organism at the designated point, irrespective of his consciousness. It also fixes the attention of the patient at the same point, thus doubling the sources and the effect of the incited nervous powers. The vital system has no longer a divided occupation; it devotes itself solely to the extension of rhythm, which thereupon becomes deeper, as indicated by the increased degree of the rising and falling of the abdomen under the hand. The abdominal muscles act strongly, and aspiration from the sac is hastened, and all mechanical obstacles thereto are overcome.

Auto-aspiration is further promoted by causing the hand of the operator to apply compression to the abdomen, synchronous with the movements of respiration. The hand bears with considerable weight *during expiration*, and forces from the chest an unusual amount of residual air. The compression is removed during inspiration, and its degree is necessarily proportioned to the expiration. In this way the aspiring force, withdrawing the occluded fluids, may be very greatly increased at the option of the physician.

7. The tension of the interior or proximal portion of the imprisoned intestine is increased by the action above described. This tension, which, by facilitating the flow of fluid from the veins and tissues of the sac, and by diminishing through stretching the dimensions of the structural elements, is doubly useful, and may be increased at will. The increase of tension is painless and safe, because only strong and healthy tissues are subjected to it. The structural parts *within* the sac have been weakened by turgescence, by inflammation, by defective circulation, and perhaps by ill-advised manipulation, and are incapable of bearing similar treatment without damage.

The tension of the neck produced under preceding parts of this process is caused by gravitation, and increased by the respiratory motions. To these forces is easily added the direct compression of the hands of the physician, to any degree that may seem fit. One or both hands being placed on the abdomen near the pubis, the mass of the intestines is pushed, with a strong, stroking motion, *from* the hernial end of the cavity. The operator's hands engage with the intestines, through the yielding walls of the abdomen, and these are urged before them, in proportion to the power applied.

The whole force thus applied at the exterior, is necessarily transmitted to the attachment of the intestine at the hernial neck. The force of the operator supplements the previously-described portions of the process in detaching the imprisoned gut, should additional force be required. The last described action may be necessary for severing adhesions which perhaps have long existed in cases of hernia previously found irreducible.

8. The hands of the patient should remain clasped over the patient's head, and his thighs and trunk in inclining position till the strangulation is removed. Relief comes at once, and complete reduction follows in a variable period, from a few moments to a few hours, according to the degree of morbid change the contents of the sac may have suffered from delay. The time required for complete reduction is in no proportion to the size of the tumor. Exterior assistance may be supplied according to the judgment of the physician; not by pushing, but rather by aiding in detaching portions of the neck, kept from receding by the sharp tendinous edges of the canal, especially in the femoral form of hernia. In no case is the least pain or even inconvenience given the patient at any stage of these remedial

procedures. On the contrary, suffering is usually abolished at the early stages of the process, and sedatives are not needed. A bag of pounded ice applied to the tumor is of service, and in general should be employed. The local tenderness, soreness and pain yields from the beginning ; the vomiting and retching also cease. If there be strong evidence of grave morbid changes within the hernial sac, the rate of auto-aspiration should be made to proceed slowly. In this way the possible consequences of too rapid additions of dead, possibly septic material to the circulation, would be obviated.

It is not expected, nor indeed is it needful, that the above-described stages of the curative process be servilely followed. The purpose is to render important principles intelligible, rather than give precise directions. The physician should understand that while principles are substantial and permanent, their practical application admits of adjustment to accord with the special character of the case in hand. A large variety of methods are described in "Pelvic and Hernial Therapeutics," from which selections may be made. These, however, are mostly adapted to the requirements of chronic rupture, and affections, within the pelvis.

The principles above set forth may perhaps be more fully illustrated in describing an additional remedial process, adapted to produce similar effects. The process to be described may be used in alternation with that above particularized, or instead of it, as may be judged proper.

The purpose is to cause simultaneous aspiration and tension of the inner portion of the invaginated intestine, and may be resolved into the following particulars :

Elongation of the upper end of the abdomen, thus causing its contents to *recede* from the opposite or hernial end.

Reversal of gravitation of the whole mass of contents of the abdomen.

Expansion of the diaphragmatic portion of the cavity, and consequent transfer *from* the hernial region of the abdominal contents.

Involuntary muscular effort at the hernial region, caused by necessity of maintaining balance, which also greatly increases rhythm. These effects converge at the point of hernia in the form of tension.

These different parts of the process unite in producing both

aspiration and tension of the imprisoned intestine; effects secured by the following procedures:

The patient lies extended on the floor or a hard couch, face downward, supported by the elbows, which are perpendicular to the shoulders.

His legs are seized by the operator, one arm being passed under the thighs about midway, while the other hand grasps both legs below the knees. The patient's legs and trunk are now raised so that they shall be in a straight line, diagonal to the floor, and in the same act carried back, so that while the elbows remain at the same spot, the arms shall be in line with the trunk and legs, the whole length of the body making a single diagonal line of such degree of inclination as the operator may elect.

The patient is retained in this position momentarily, or during a few respiratory motions, and is then permitted slowly to recede to the commencing position. This process may be many times repeated, allowing a few moments to intervene between each repetition.

This process may be executed slowly; the effects above stated are then mild but very positive and unequivocal. Or, it may be executed with rapidity, in which the tension of the interior or proximal segment of the entrapped intestine is exceedingly vigorous; a strain is produced capable of disrupting old and extensive adhesions when these are in the way of reduction.

The aspiring effect thus secured is equally strong. The suction of the interior of the venous vessels, together with the narrowing of the gut by tension, causes not only outflow of venous blood, but also of the intestinal fluids of the neck and sack. This movement of the combined fluids is a necessary consequence of causing space, or tendency to vacuum, contiguous to such fluids. An outlet is made for all fluids within the hernial sac, and strangulation is removed.

The above detailed descriptions of methods for relieving strangulation and for the radical cure of both it and the accompanying hernia, may, it is conceivable, invite criticism on two points. One is, the actuality of auto-aspiration; the other is, the sufficiency of mechanical energy, which, by the means described, may be thought to bear on the interior segment of

the invaginated and fixed intestine. For physicians who have had no experience with methods similar to those above detailed, only rational considerations are available; those who have experience or observation are already satisfied, and require no further proof.

As to auto-aspiration, it exists in sufficient degree in health to return the venous circulation from all non-muscular parts, as the pelvis, the head, the visceral organs; and with irregular muscular assistance, from the extremities. Any one can, by *voluntarily forced* respiration, cause the head to become dizzy, and the feet cold, in a few moments. These are unquestionable consequences of voluntary auto-aspirations.

Aspiration commences the moment differences of pressure begins, between the two portions of the cavity. When the neck presents mechanical obstacles, aspiration begins when the difference of pressure rises to the degree necessary to force the obstacles out of the way. In strangulation, the desired difference of pressure is initiated by hydrostatic force, superinduced by changed position and relations of parts. To this is subsequently added the mechanical force derived from rhythm, from forced rhythm, from extension, from gravitation, and from involuntary muscular incitation or struggle. These are combined by the processes, as a single aspiratory or suction forces.

The aspiratory effects are practically apparent in a few moments after the conditions described have been complied with, so that positive demonstration follows hard upon the rational considerations.

As to the amount of mechanical energy brought into exercise and expended as interior tension of the entrapped gut and omentum, the reader is invited to *estimate* the value of the following contributory particulars:

The tension produced at the hernial neck, by suspending the abdominal mass from it. This suspension is a practical part in the position assumed.

The tensive effect of the oscillatory motion communicated by rhythm, in connection with the suction or aspiration acting on the structures, all acting *with* instead of against gravitation.

The amount of pull extending to the hernial region from the action of the muscles of the chest when these are under extreme tension.

The amount of interior pull caused by the sudden raising and expanding of the diaphragm, as when the piston of a pump is suddenly raised.

The amount of push, acting in the same direction and therefore auxiliary thereto, caused at the hypogastric region by reflex incitation or struggle.

The amount of tension of the confined intestine by the compression of the abdomen by the hand, urging their contents *from* the point from which the intestine is suspended at its neck.

The advantage offered by oscillatory motion caused by respiration, in detaching the entrapped intestine.

The advantage of the co-operation of all these conditions in causing return of the structural parts to the abdominal cavity.

The increase of detaching power, by the exercise of tact and, especially should circumstances require, of making the combined tractive forces *suddenly* operative.

The following obstacles may exist previous to an attempt at relief at strangulation by the means above pointed out. The patient may be *moribund*, so that auto-aspiration becomes impossible from lack of the indispensable instrument. In case of sphacelus, even the return of the protrusion may not obviate a fatal issue.

Another condition is conceivable by the neophyte, but can not be conceded as existing separately from those above stated. This is, imperviousness of the hernial neck and canal to their own fluids, and therefore to those of the sac. Auto-aspiration only requires interstitial moisture for its beginning; and such beginning is coincident with strong tension and therefore diminished sectional area of the incarcerated structural substance.

The remedial principles available for strangulation may now be recapitulated as follows:

1. In case of strangulation, the imprisoned mass consists chiefly of fluid. The structural elements are comparatively insignificant, and considered separately, afford little or no obstacle to their return through the canal. *The patient's life is endangered by giving primary attention to the structures.* These require no attention when proper provision is made for the fluid ingredients of the sac. The sole practical difficulties are associated with incarcerated fluids.

2. Strangulation is removed when the fluids of the sac are

diminished. Danger is obviated by opening the venous outlets into the general circulation. This renews the circulation, and revives the faltering vitality of the strangulated mass.

3. The venous outlets are practically opened by *auto-aspiration*. This consists in causing differences of pressure in the abdominal and hernial portions of the cavity, connected by the hernial neck. By auto-aspiration the fluids of the hernial sac are compelled to percolate from the hernial sac, whether following the course of the venous outlets or the movements of tissue-fluids.

4. Auto-aspiration from the hernial sac is produced by mechano-physiological forces, acting by means of the respiratory apparatus. To these may be added gravitation, reflex incitation, and exterior compression. These forces are made to converge at the interior of the hernial canal and neck, causing the physical effect known as aspiration.

These forces also unite as tension of the interior segment of the intestine. The degree of tension attainable in the use of the means described is practically unlimited and sufficient for release of the gut or omentum, even in case of adhesions.

5. The remedy for strangulation now explained is not only painless, but affords speedy relief of pain and accompanying nervous symptoms. It is not a mere palliation, crowding the potential affection behind a freshly-made wound, a bandage, or truss, but is an absolute and permanent removal of the cause and the effect, together. The patient requires no subsequent confinement or restriction from ordinary duties more than would be dictated by common sense. It is, however, best for the patient to become familiar with the principles above discussed, so far as to enable him to intelligently cultivate the mechano-physiological process through whose defect the accident of strangulation occurred, and thus obviate recurrence.

6. The radical method with strangulation whose principles are above explained, does not insist on thorough accomplishments in surgery, in the sense of competency to make and to dress wounds, to apply bandages, trusses, etc. It insists on no other creed than an intelligent and practical comprehension of the mechano-physiological principles herein set forth. The physician may then trust himself, and be trusted, in the management of the severest and most alarming cases, in full confidence of the sufficiency of the precepts above given.